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(54) Printed grating decorative plate.

(57) A printed glass holographic grating decorative plate, to be used chiefly as interior and exterior wall panel for building, fancy floor, articles of daily use and furniture ornaments. The glass plate (1) is imprinted by means of printing technology with a layer of pattern (2) in coloured printing ink or of vitreous enamel. After heating to make it become solidified or sintering, the glass surface or the printed layer surface is processed to have a layer of adhered transparent resin (3). Then is added a layer of resin (5) in grating relief with reflexive metal film (4). A plate of printed glass grating decorative panel is thus obtained. This product can overcome shortcomings in prior arts. It merges into a single whole the simpleness analogue to those of the natural stones, such as marble and granite and of ceramic tiles, or the artistic pattern of the imprinted glass and the magnificent optical effects of the grating.

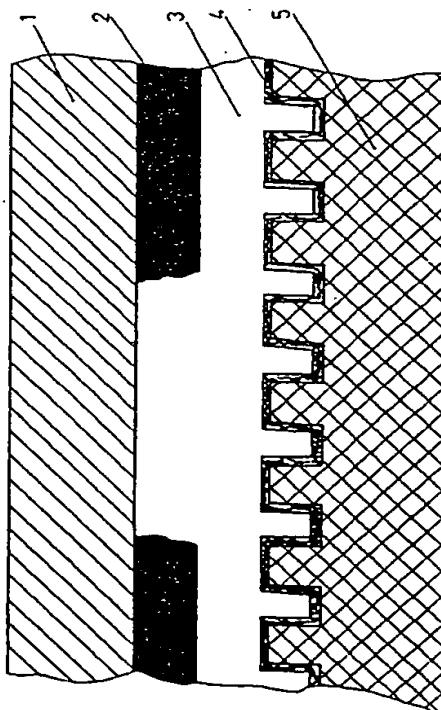


Fig. 2

EP 0 540 335 A2

The present invention relates to a decorative material, in particular, to a printed grating decorative panel for decorating a surface of a interior or exterior wall, floor plate in a building, or articles of everyday use and furniture.

Conventional holographic grating products can be grouped into two categories, one is a layer of thermoplastic resin film, made by thermocompression mark technology, such as, the manufacture technology of preventing trade-mark counterfeit, the other is to apply a light-sensitive material over a plate of glass, made by optical processing technology. Still another is to apply a resin of cross-linking molecular structure to the glass by means of a lately-developed technology, made by grating die-casting technology. For example, Chinese patent Application CN87103741A filed by the same applicant on June 1, 1987 discloses a novel type construction decorative material as a holographic decorative brick. This decorative brick (cf. Fig 7 of the accompanying drawings) is formed by imprinting a laser holographic or grating pattern on a substrate (1) made of, such as, transparent glass, glass epoxy or acrylic dope film, then coating it with a layer of highly corrosion resistant metal reflecting film (2), and finally applying to it a protective layer (3). Another example is Chinese Patent Application CN87105800A entitled "Holographic Grating Solar Film" filed by the same applicant on August 28, 1987, which discloses a novel type of decorative material. It can be seen from Fig. 8 that this decorative material is formed by costing a layer of dark brown resin (3) on the surface of a transparent plastic film (4), after heating to make it soften, imprinting a laser holographic or grating pattern on it, through a pattern plate or pattern roller reproduced from a dry plate processed by using laser hologram or grating photoetch technology, then coating it with a very thin layer of metal reflecting film (2) and applying a transparent pressure sensitive gel. However, the holographic or grating pattern of the above-mentioned products are too abstract and too monotonous to display a combined effect of hologram or grating and the designs and patterns of marble, granite or a ceramic tile. In addition, the ageing-resistance property thereof is poor. This is why the range of application for the conventional holographic grating products is so limited.

The object of the present invention is to provide a printed glass-type holographic grating decorative plate that can overcome the above-mentioned shortcomings of prior art.

According to the present invention there is provided a printed grating decorative plate comprising a transparent plate glass, a layer of adhered resin, a protective resin layer in grating or holographic pattern relief with metal reflecting film layer, characterized in that it comprises further a layer of pattern in coloured printing ink or of vitreous enamel on said plate or be-

tween said glass plate and said adhered resin layer.

Thus the decorative material provided by the present invention may comprise a colorless or coloured transparent glass in blue, dark brown, grey, yellow, green and red etc., or glass coated with heat reflecting metal film in various colour or strengthened glass as a substrate. The glass may be first coated by printing process with a layer of pattern in printing ink, the ink can be vitreous enamel or organic printing ink, and the pattern can be monochromatic or of various colours superposed or combined. Preferably after heating, baking or sintering, the pattern can be adhered to the glass or fused to form a whole. Then the printed surface or the naked side of the glass can be adhered with the resinous layer of metal reflecting film with grating structure. Here the metal reflecting film layer with grating structure can be coated according to specific pattern requirement so that some portions of which provided with metal film are a complete transparency, while the other portions of which present the pattern formed by the metal reflecting film grating. The thickness of the layer of metal film coating can be controlled to make its light transmissivity had a range of 10%-90% so as to meet the requirements of various designs. The adhesive material used may be a layer of light sensitive resin, a layer of pressure sensitive resin, or a layer of resin of cross-linking molecular structure. The grating resin layer with metal reflecting film layer can be a layer of resin of cross-linking molecular structure or a layer of thermoplastic resin. The resin used can be a transparent resin or a non-transparent resin. In order to strengthen the protection of the grating resin layer, a layer of glass or resin or any other solid-sheet material can be adhered to the resin layer of grating or holographic pattern in relief with metal reflecting film layer.

Thus the invention can present an artistic pattern of combining the magnificent optical effect of the grating with a sense of natural simplicity as from a marble or granite porphyry, and the colour hue of a tile or printed glass. It has also the properties of fastness to light, heat resistance and durability that are indispensable for a construction material for the exterior wall.

Exemplary embodiments of the present invention will be described below in detail with reference to the accompanying drawings, in which:

Fig. 1 is a plan diagrammatic view of a first embodiment of the printed glass grating decorative plate according to the present invention.

Fig. 2 is a sectional view of the decorative plate shown in Fig. 1.

Fig. 3 is an enlarged plan diagrammatic view of the grating portion of the transparent glass without a coloured printing ink layer of the product shown in Fig. 1.

Fig. 4 is a plan diagrammatic view of a second embodiment of the printed glass grating decorative

plate according to the present invention.

Fig. 5 is a sectional view of the product shown in Fig. 4.

Fig. 6 is an enlarged diagrammatic view of the metal reflecting grating of the transparent glass portion without a blue coloured vitreous enamel of the product shown in Fig. 4.

Fig. 7 and 8 show holographic grating products in the prior art.

Figs. 1, 2 and 3 show a first embodiment of the printed glass grating decorative plate of the present invention.

Fig. 1 shows the substrate of the first embodiment, a 6mm transparent glass plate, in which the black part is the pattern in black printing ink at the back, and the white part is the square grating and the metal reflecting layer part visible at the back of the glass. It can be seen from Fig. 2 that the decorative plate is composed of a plane transparent glass (1), a layer of black printing ink (2), a layer of adhered transparent epoxy resin (3), a layer of metal reflecting film (4), and a protective resin layer in grating relief (5). Fig.3 shows the grating part of the transparent glass of the decorative panel without a printing ink layer. From the drawing can be seen the square gratings distributed all over with a spacing of 2 microns, the black part being the depressed portion of the relief.

The manufacturing process of the decorative plate is as follows:

A layer of pattern in black printing ink (2) is imprinted on the plate glass (1) by means of printing technology. After solidifying it by heating, the printed surface is processed to have a layer of adhered transparent resin (3). Then, the laminated product is coated with a protective resin layer in grating relief with reflexive metal film (4). After the resin is solidified, the final product of printed glass grating decorative plate is obtained.

Figs. 4, 5 and 6 show a second embodiment of the printed glass grating decorative plate of the present invention. Fig. 4 shows the substrate plane of the second embodiment, a 8mm transparent glass plate in which the black part is the pattern formed by blue coloured vitreous enamel on the surface, and the white part is the metal reflecting layer part on the square grating visible inside the glass. It can be seen from Fig. 5 that the decorative plate is composed of a transparent strengthened plate glass (6), a layer of blue coloured vitreous enamel (7), strengthened simultaneously with the strengthened glass layer, a layer of adhered transparent epoxy resin (3), a layer of metal reflecting film (4), and a layer of protective resin (5) with grating relief. Fig. 6 shows the metal reflecting grating of the transparent glass part of the decorative plate without a blue coloured vitreous enamel. From the drawing can be seen the square gratings distributed all over with a spacing of 2 microns, the black parts being the depressed portions of the relief.

The manufacturing process of the decorative plate of the second embodiment is as follows:

A layer of pattern formed by the blue coloured vitreous enamel (7) is imprinted on the plate glass (6) by means of printing technology. After heating, sintering and tempering the layer, the side without a pattern thereof is coated with a layer of transparent epoxy resin (3). And then a protective resin layer (5) in grating relief with metal reflecting film (4) is attached to it. A plate of printed glass grating decorative panel is obtained after the resin is solidified, which can be used as floor bricks.

When the above-described product of the present invention is to be compared with the prior art "holographic decorative brick" mentioned at the beginning of this application, not only the appearance is greatly improved, exhibiting fully the combining effects of grating and the artistic pattern of marble and its like, but also the ageing resistance is bettered as much as tenfold. It is particularly suitable for use as the decoration of an exterior wall where the prior art products are not suitable.

While the present invention has been described above with respect to preferred embodiments thereof, the scope of protection for this invention should not be limited only to these embodiments, but rather defined by the appended claims.

## 30 Claims

1. A printed grating decorative plate comprising a transparent plate (6,1), a layer of adhered resin (3), a protective resin layer (5) in grating or holographic pattern relief with metal reflecting film layer (4), characterized in that it comprises further a layer of pattern (7,2) in coloured printing ink or of vitreous enamel on said plate (6) or between said plate (1) and said adhered resin layer (3).
2. A printed grating decorative plate according to claim 1, characterized in that said transparent plate (1,6) is coloured in dark brown, red, grey, blue, green, yellow etc or coated with heat reflecting metal film in any colour.
3. A printed grating decorative plate according to claim 1 or 2, characterized in that said metal film layer (4) is a relatively thick, non-transparent metal film layer, or is a metal film layer coated in accordance with a specific pattern requirement so that some parts of the product are transparent, while some other parts present a pattern formed by the grating metal film; or is a metal coated film layer, the thickness of which is so controlled that its light transmissivity is between 10%-90% and its diaphaneity is desirable.

4. A printed grating decorative plate according to claim 1, 2 or 3 characterized in that said adhered resin layer (3) is a coated layer of light sensitive material, or a pressure sensitive resin layer, or a layer of resin of cross-linking molecular structure. 5

5. A printed grating decorative plate according to claim 1, 2, 3 or 4 characterized in that said grating protective resin layer (5) with metal reflecting film layer is a layer of resin of cross-linking molecular structure or a layer of thermoplastic resin; the resin used being a transparent resin or a non-transparent resin. 10

6. A printed grating decorative plate according to claim 1, 2, 3, 4 or 5 characterized in that said pattern (2,7) formed by printing ink or vitreous enamel is monochromatic or of various colours superposed or combined. 15

7. A printed grating decorative plate according to any one of claims 1 to 6 characterized in that it comprises further a protective layer of glass or resin or any other solid sheet material adhered to the protective resin layer (5). 20 25

8. A printed grating decorative plate according to any one of the preceding claims where the plate (1) is of glass or strengthened glass of any colour. 30

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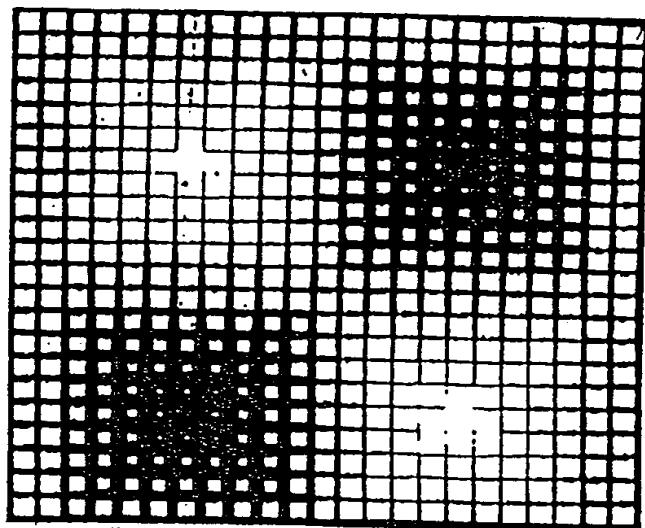


Fig.1

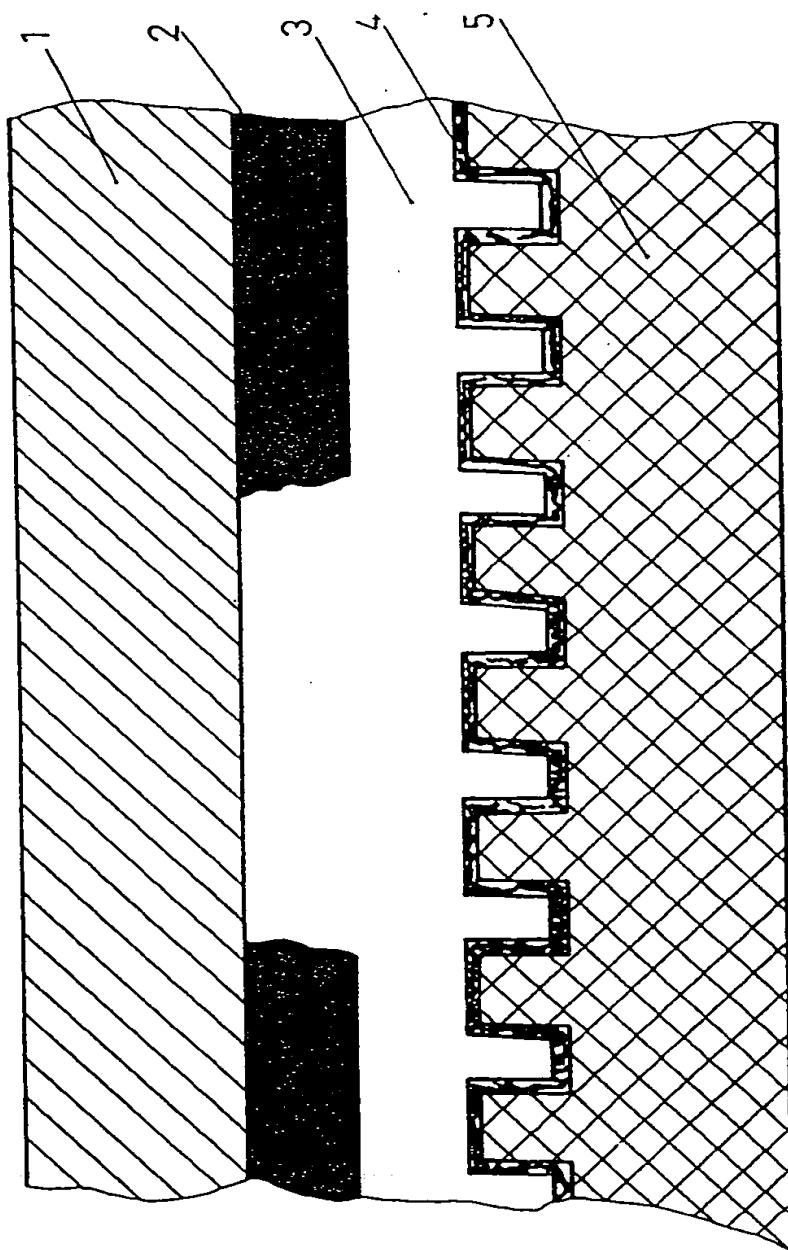


Fig.2

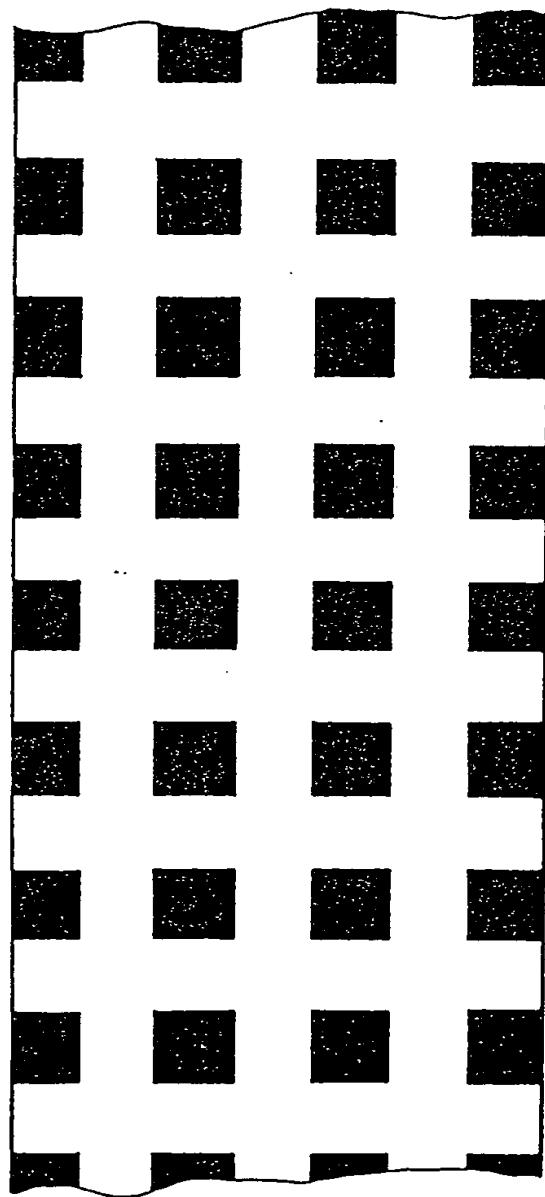


Fig. 3

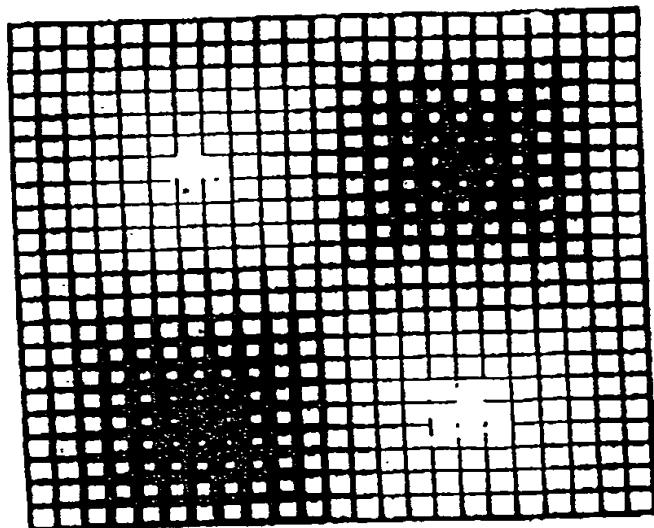


Fig.4

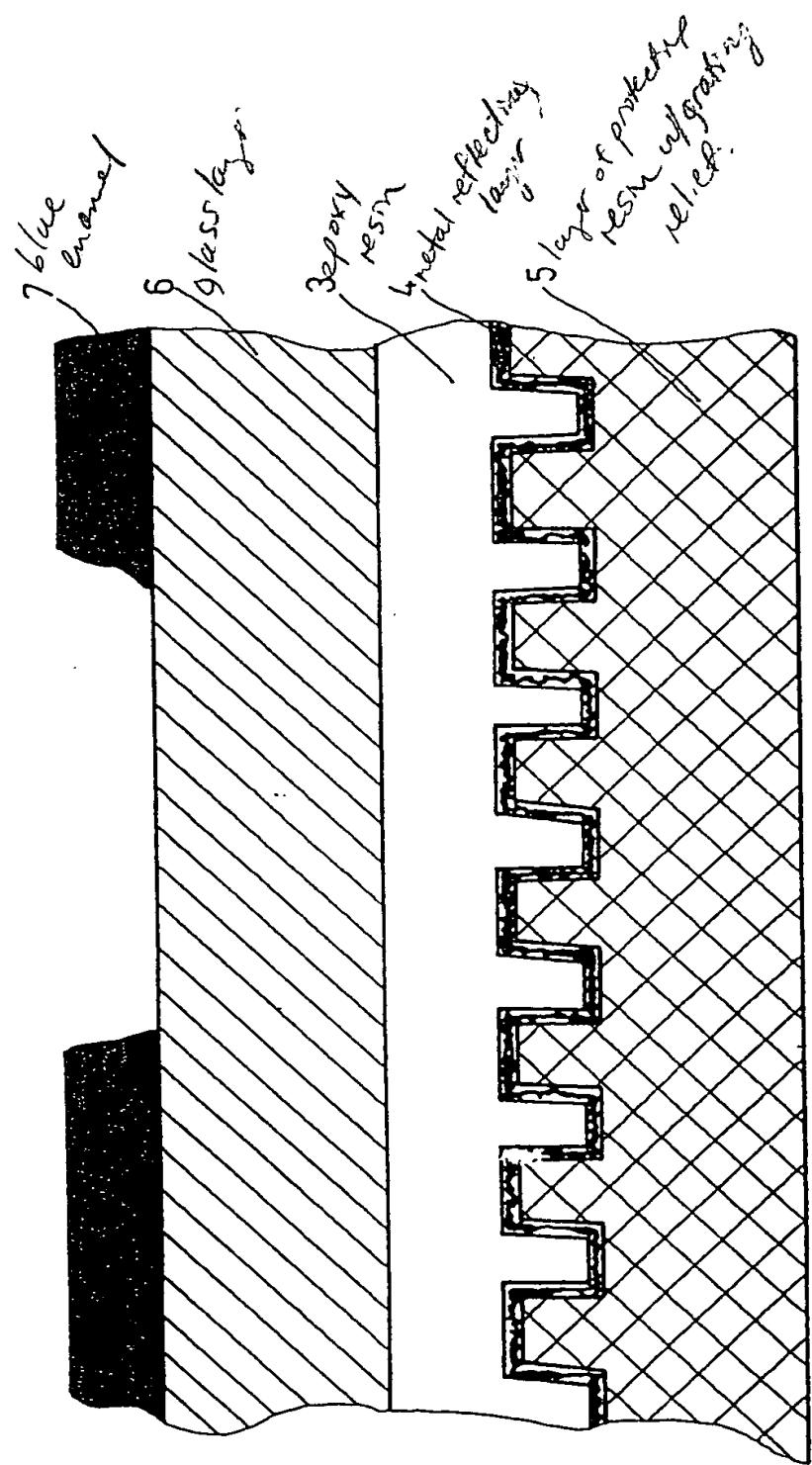
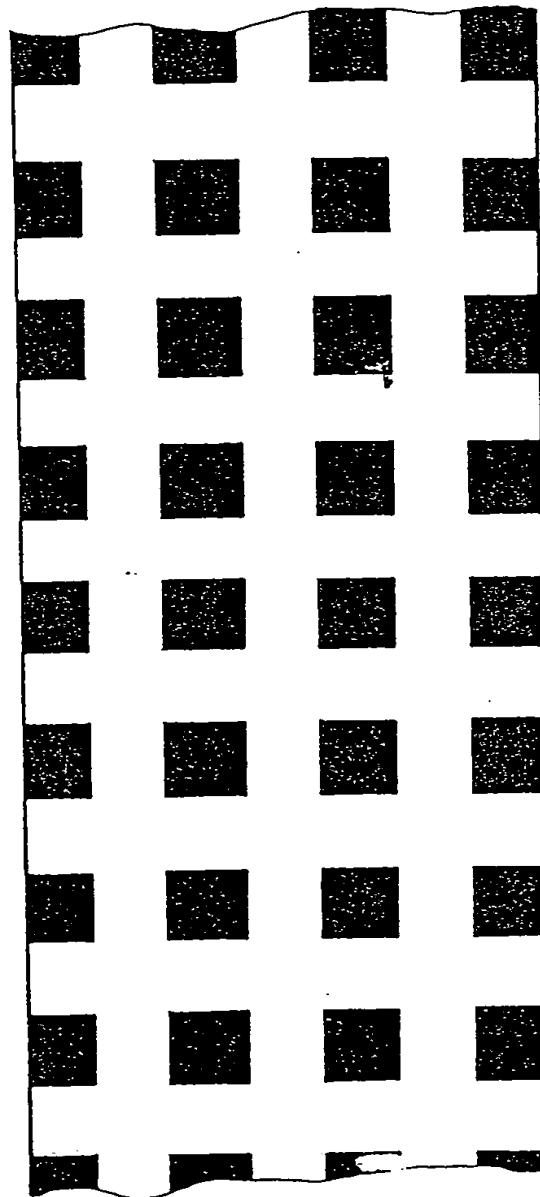


Fig.5



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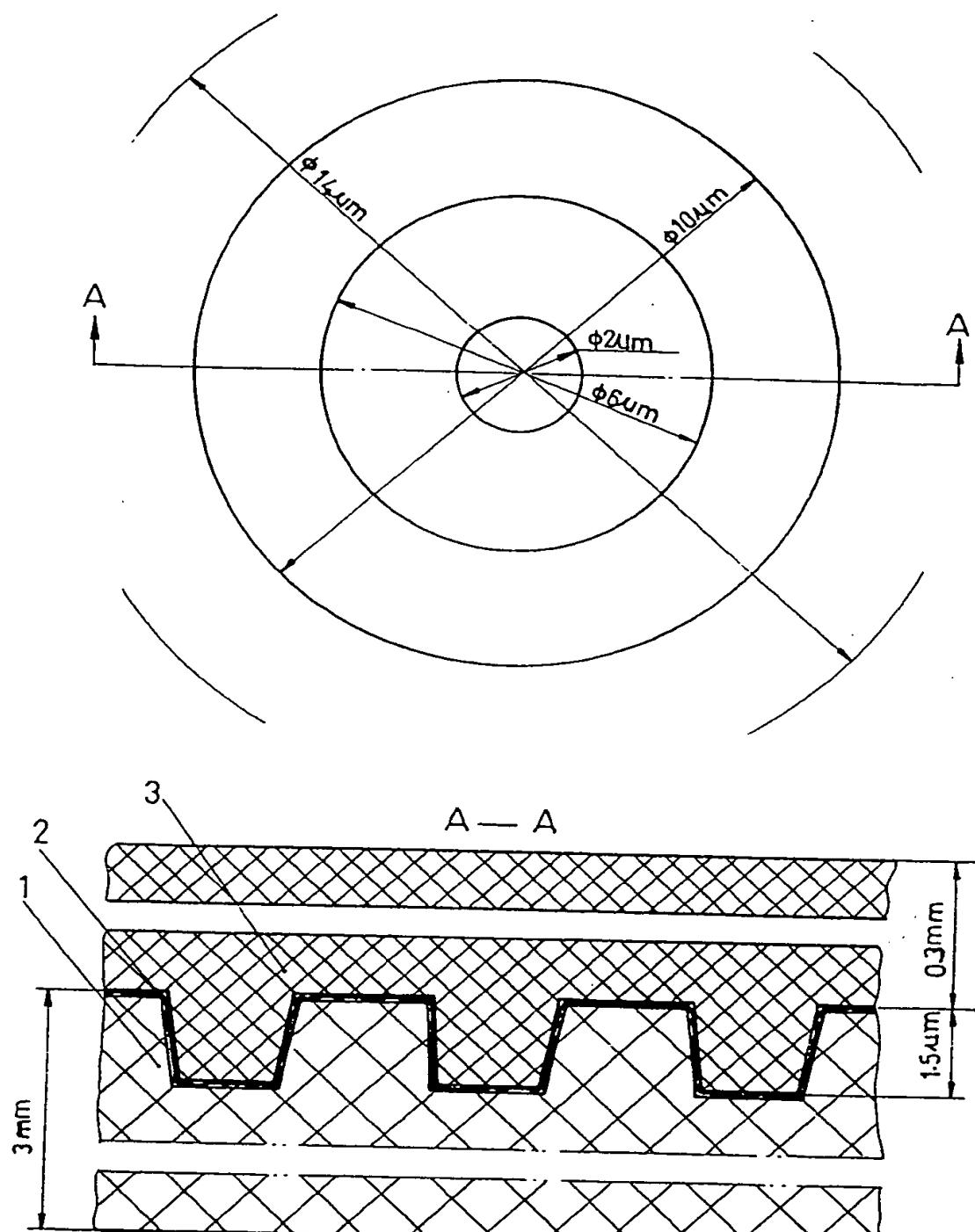


Fig.7

$$M = \frac{10000}{1}$$

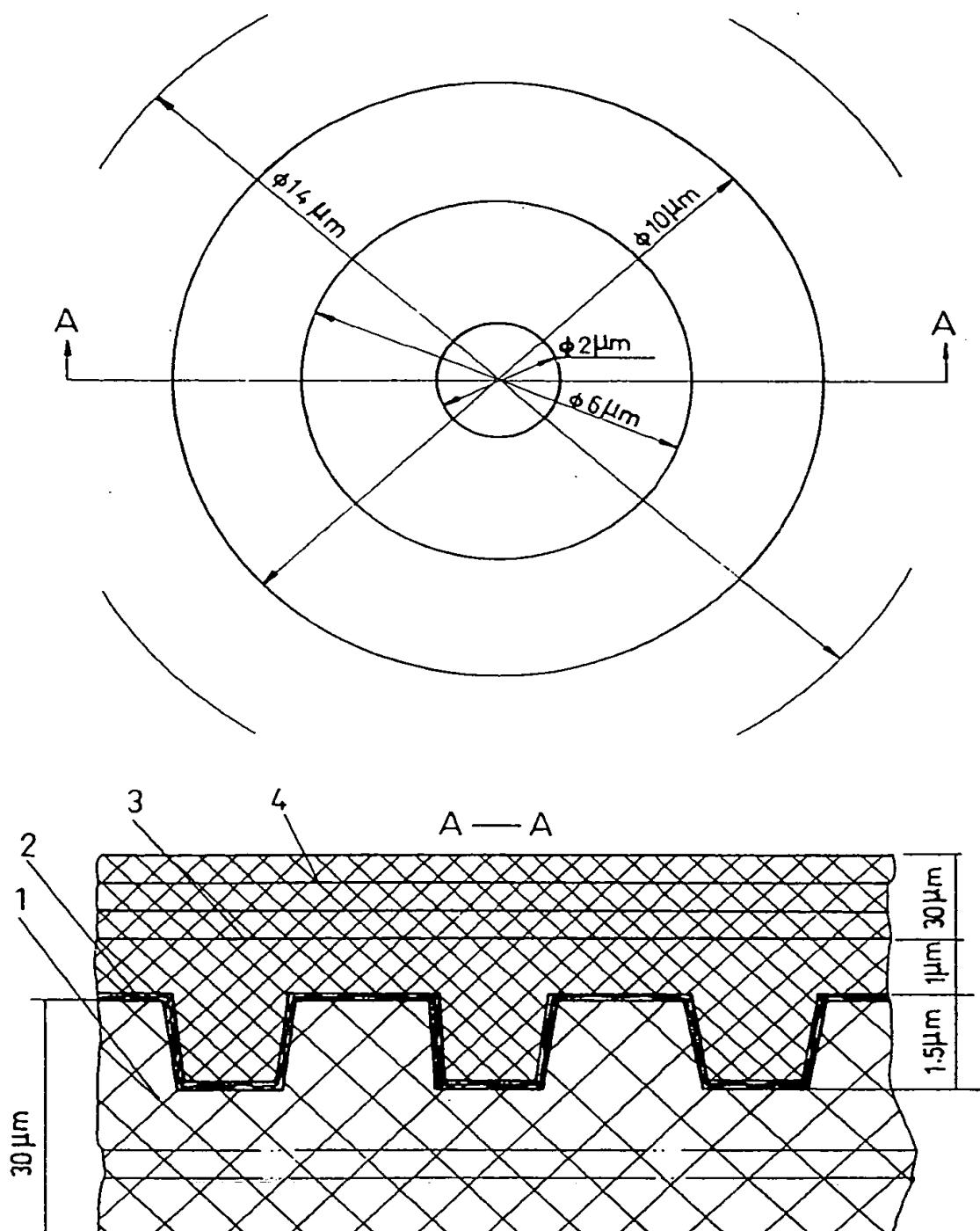


Fig. 8